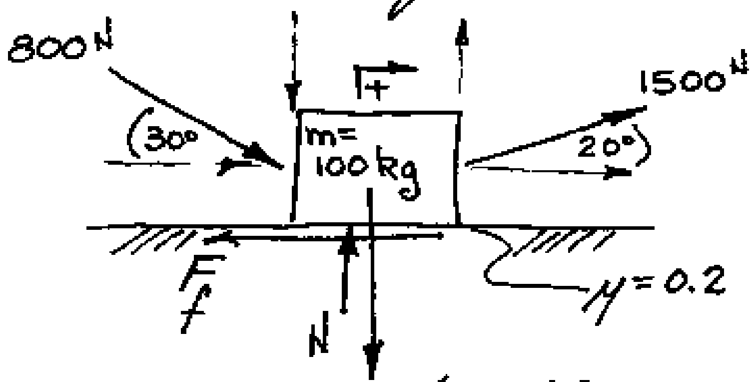
HIBBELER

14-7

ANALYSIS BY NEWTON'S 2^{nd} LAW.
YOUR H.W. requires the ENERGY METHOD.



$W = (100\,kg)(9.81\,\frac{m}{s^2})$
$= 981\,N.$

ORIGINALLY AT REST
$t_0 = 0,\ x_0 = \dot{x}_0 = \ddot{x}_0 = 0$

$t_f = t,\ x = ?$
$\dot{x} = 6\,m/s$
$\ddot{x} = ?$

$\Sigma \vec{F}_x = m\vec{a}_x = m\ddot{x}$

$800\cos 30° + 1500\cos 20° - F_f = (100\,kg)\ddot{x}$ ①
(F_f ?)

$\Sigma \vec{F}_y = m\vec{a}_y^{\,0} = -800\sin 30° + 1500\sin 20° + N - 981\,N$ ②

$N = 867.97 \approx 868\,N.$

back sub.

① $800\cos 30° + 1500\cos 20° - (0.2)(868) = (100)\ddot{x}$

$\frac{1928.76\,N}{100\,kg} = $ $\boxed{19.288\,\frac{m}{s^2} = \ddot{x}}$ CONSTANT ACC.

$\ddot{x} = \frac{d\dot{x}}{dt} = \frac{dv}{dt}$ } $\int_0^t 19.288\,dt = \int_0^6 dv$

$(19.288\,\frac{m}{s^2})t = 6\,\frac{m}{s}$ } $\boxed{t = 3.215\,s}$

time to reach a speed of $6\,\frac{m}{s}$ from rest.

$2a(s - s_0) = V_f^2 - V_0^2$

$2(19.288\,\frac{m}{s^2})S = (6\,\frac{m}{s})^2$ $\therefore$ $\boxed{S = 0.933\,m}$